

AMENDMENTS TO THE CLAIMS

1. (currently amended) Functional transitional metal silicates (FTMS) having transitional metal to silica ratio in the range of 0.34 to 19.57, variable functions resulting from different metal silicate ratios and also having variable functional structure for same transitional metal to silica ratio, exhibiting properties selected from the group comprising of decontaminant, disinfectant, protectant, microbicide or combination thereof and A method for controlling microbes, said method comprising contacting the microbe with at least one functional transition metal silicate selected from the group consisting of:

- (a) cupric silicates having a silica to copper ratio in the range of 1:0.34 to 1:5.15;
- (b) zinc silicates having a silica to zinc ratio in the range of 1:2 to 1:12;
- (c) silver silicates having a silica to silver ratio in the range of 1:15 to 1:19.5;
- (d) manganese silicates having a silica to manganese ratio in the range of 1:1 to 1:1.9;

and

- (e) zirconium silicates having a silica to zinc ratio in the range of 1:0.77 to 1:2.9;

wherein said transition metal silicates are prepared by the process comprising the steps of [[a.]] (i) adding a transitional transition metal salt solution to a soluble alkali silicate solution to form a mixture; [[b.]] (ii) forming a precipitate of a transitional transition metal silicate, and [[c.]] (iii) washing and drying the precipitate thus formed to obtain the transitional transition metal silicate, wherein characterized in that in step (i) [[(a.)]], the ratio between the transitional transition metal salt solution to the alkali silicate solution is varied, the temperature at which the solutions are mixed is varied between 20 to 90°C, and the pH of the medium is varied between about 2 to about 11 extremely acidic condition to extremely basic condition, preparing variable functional structure for same transitional metal to silica ratio at varied conditions, also having variable functional structure for same transitional metal to silica ratio, and said FTMS capable of being immobilized on a suitable material or incorporating into resins and/or coating along with resins on suitable materials.

2. – 54. (cancelled).

55. (new) The method as claimed in claim 1, wherein the cupric silicate is prepared under acidic conditions, has a silica to copper ratio of 1:5.15, and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.5; (c) 2.3; (d) 2.0 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16.2, 32.2 and 39.7 having peak heights of 2128, 1593 and 1470, respectively.

56. (new) The method as claimed in claim 1, wherein the cupric silicate is prepared under neutral conditions, has a silica to copper ratio of 1:1, and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 3.1; (b) 2.3; (c) 2.0; (d) 1.2 and (e) 0.9; and X-ray diffraction analysis having 3 significant peaks at 16.1, 32.2 and 39.7 having peak heights of 940, 764 and 694, respectively.

57. (new) The method as claimed in claim 1, wherein the cupric silicate is prepared under acidic conditions, has a silica to copper ratio of 1:0.78 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 2.2 and (b) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16, 32 and 39 having peak heights of 835, 706 and 502, respectively.

58. (new) The method as claimed in claim 1, wherein the cupric silicate is prepared under extreme acidic conditions, has a silica to copper ratio of 1:0.53 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 2.1, (b) 2.0 and (c) 2.1; and X-ray diffraction analysis having 3 significant peaks at 16.1, 32.2 and 39.71 having peak heights of 400, 394 and 330, respectively.

59. (new) The method as claimed in claim 1, wherein the cupric silicate is prepared under extreme acidic conditions, has a silica to copper ratio of 1:0.34 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance

spectrometer being (a) 2.1, and (b) 2.0; and X-ray diffraction analysis having 3 significant peaks at 16.2, 32.3 and 39.8 having peak heights of 541, 414 and 365, respectively.

60. (new) The method as claimed in claim 1, wherein the zinc silicate is prepared under neutral conditions, has a silica to zinc ratio of 1:12.13 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 5.4; (b) 4.5; (c) 2.5; (d) 2.1 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 32.7, 59.5 and 26.2 having peak heights of 444, 307 and 263, respectively.

61. (new) The method as claimed in claim 1, wherein the zinc silicate is prepared under extreme acidic conditions, has a silica to zinc ratio of 1:2.46 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.0; (c) 2.5; (d) 1.8 and (e) 2.0; and X-ray diffraction analysis having 3 significant peaks at 11.0, 33.5 and 32.8 having peak heights of 2079, 835 and 664, respectively.

62. (new) The method as claimed in claim 1, wherein the silver silicate is prepared under neutral conditions, has a silica to silver ratio of 1:19.57 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.3; (c) 3.9 and (d) 2.0; and X-ray diffraction analysis having 3 significant peaks at 32.2, 46.2 and 27.8 having peak heights of 3945, 2421 and 1835, respectively.

63. (new) The method as claimed in claim 1, wherein the silver silicate is prepared under extreme acidic conditions, has a silica to silver ratio of 1:1.04 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.0 and (c) 1.9; and X-ray diffraction analysis having 3 significant peaks at 29.3, 47.6 and 42.3 having peak heights of 2217, 684 and 674, respectively.

64. (new) The method as claimed in claim 1, wherein the manganese silicate is prepared under neutral condition, has a silica to manganese ratio of 1:1.94 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 1.93 and (b) 2.06; and X-ray diffraction analysis having 1 significant peak at 30.6 having peak height of 148.0.

65. (new) The method as claimed in claim 1, wherein the manganese silicate is prepared under extreme acidic conditions, has a silica to manganese ratio of 1:1.09 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 4.1; (c) 2.1; (d) 2.1; (e) 2.0 and (f) 1.9; and X-ray diffraction analysis having 1 significant peak at 24.6 having peak height of 32.8.

66. (new) The method as claimed in claim 1, wherein the zirconium silicate is prepared under neutral conditions, has a silica to zirconium ratio of 1:2.9 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.42; (b) 1.82; (c) 2.24; (d) 2.3; (e) 2.18 and (f) 1.23;

67. (new) The method as claimed in claim 1, wherein the zirconium silicate is prepared under extreme acidic condition, has a silica to zirconium ratio of 1:0.77 and exhibits the following characteristics: characteristic g values of the peaks as obtained by the electron spin resonance spectrometer being (a) 4.3; (b) 2.8; (c) 1.9; (d) 1.2; (e) 1.0 and (f) 0.9; and X-ray diffraction analysis having 1 significant peak at 10.8 having peak height of 84.80.

68. (new) The method as claimed in claim 1, wherein the microbes are selected from the group comprising of protozoa, bacteria, fungi, viruses, and combinations thereof.

69. (new) The method as claimed in claim 68, wherein the bacteria is selected from the group consisting of coliform bacteria, Gram positive bacteria, Gram negative bacteria, or a combination thereof.

70. (new) The method as claimed in claim 68, wherein the protozoa is *Cryptosporidium parvum*.

71. (new) The method as claimed in claim 68, wherein the fungus is a pathogenic fungus selected from the group consisting of *Sclerotium rolfsii*, *Rhizoctonia solani*, *Fusarium oxysporum*, *Pyricularia oryzae*, *Aspergillus sps*, or a combination thereof.

72. (new) The method as claimed in claim 68, wherein the virus is infective in nature.

73. (new) A method for reducing a level of contaminants, wherein the contaminants are selected from the group comprising of metals, chemicals, pesticides, bio-molecules, and combinations thereof, said method comprising contacting the contaminant with a functional transition metal silicate or a substrate comprising a functional transition metal silicate immobilized thereupon, wherein said transition metal silicate is selected from the group consisting of:

cupric silicates having a silica to copper ratio in the range of 1:0.34 to 1:5.15;

zinc silicates having a silica to zinc ratio in the range of 1:2 to 1:12;

silver silicates having a silica to silver ratio in the range of 1:1 to 1:19.5;

manganese silicates having a silica to manganese ratio in the range of 1:1 to 1:1.9; and

zirconium silicates having a silica to zirconium ratio in the range of 1:0.77 to 1:2.9,

wherein the said transition metal silicates are prepared by the process comprising: (i) adding a transition metal salt solution to a soluble alkali silicate solution to form a mixture; (ii) forming a precipitate of a transition metal silicate, and (iii) washing and drying the precipitate thus formed to obtain the transition metal silicate, wherein in said step (i), the ratio between the transition metal salt solution to the alkali silicate solution is varied, the temperature at which the solutions are mixed is varied between 20° to 90°C, and the pH value of the medium is varied between about 2 to about 11.

74. (new) The method as claimed in claim 73, wherein the contaminant is a metal selected from the group consisting of arsenic, mercury, lead, toxic metals, pesticides, and combinations thereof.

75. (new) The method as claimed in claim 73, wherein the contaminant and or absorbent is a bio-molecule.

76. (new) The method as claimed in claim 73, wherein the contaminant is chemical selected from the group comprising trihalomethanes, semi-volatile organic compounds, volatile organic compounds, phenols, and polychlorinated biphenyls.

77. (new) The method as claimed in claim 73, wherein the contaminant is in gaseous form and contains carbon monoxide, sulphur dioxide, a nitrogen oxide, a hydrocarbon, tobacco tar, nicotine, a toxic chemical gas, or a combination thereof.